



SCARnewsletter

issue27

june2011

SCAR has always had a dual Mission. As well as the coordination of science activities SCAR provides independent, scientifically-based advice to the Antarctic Treaty System and other policy makers (see below).

This year the Treaty meeting was held in June/July in Buenos Aires, Argentina. Despite some disruption to travel plans due to the Chilean Puyehue volcano, SCAR provided two Working Papers (WPs) and nine Information Papers (IPs) (the papers are available from the SCAR website: <http://www.scar.org/treaty/atcmxxxiv/>).

The SCAR Antarctic Climate Change and the Environment (ACCE) report and updates formed a major part of the ongoing discussions of the Treaty (see <http://www.scar.org/publications/occasional/acce.html>). Two Parties (the UK and Norway) and one Observer (the Antarctic Southern Ocean Coalition) also committed to providing funds to communicate SCAR's climate related activities. Many Parties were interested in progress with the Southern Ocean Observing System, in particular that a project office has now been set up in Australia (see the article on page 2). The subject of marine acous-

tics came to the fore again and SCAR agreed to provide a literature update to its last report to inform the deliberations of the Treaty next year.

The spread of non-Native species is still a major topic of discussion and SCAR provided several papers on this subject. SCAR also presented two new Codes of Conducts: on the exploration and research of subglacial aquatic environments and on the use of animals for scientific purposes in Antarctica. Other SCAR papers covered topics such as the SCAR Scientific Research Programme Antarctic Climate Evolution (ACE) and a summary report on IPY 2007–2008 on behalf of the ICSU-WMO Joint Committee.

The SCAR Lecture this year was on "Detecting the Imprint of Humans on Antarctica: A Case Study", based around a long-term environmental monitoring programme at McMurdo station and was given by the SCAR President, Chuck Kennicutt (see below right). Meetings with CCAMLR, COMNAP and other Parties were also held in the margins of the meeting, helping to improve and cement our working relationship with partner organisations. Next year the meeting will be held in

Hobart, Australia in June and SCAR will, as usual, be providing several high-profile papers.

As a reminder, the next SCAR Open Science Conference, entitled "Antarctic Science and Policy Advice in a Changing World" will take place on Monday 16 - Thursday 19 July 2012 in Portland, USA. The first circular will be sent round soon (for further details see: <http://scar2012.geol.pdx.edu/>).

The next edition of the Newsletter will be produced jointly with our sister organization, the International Arctic Science Committee. It will be produced a little later than normal so we can report on the outcomes of the Symposium on Research Urgencies in the Polar Regions (http://www.mna.it/english/News/ICSU_symposium/registration.html) and the ICSU General Assembly, the latter which includes a dedicated polar session. We also want to encourage people to email us (at info@scar.org) with suggestions for articles to include in the next issue (deadline September 30th). Please do also let us have any general comments or suggestions for improvement.

Mike Sparrow,
Executive Director SCAR

SCAR's Mission

"SCAR's mission is to be the leading, independent, non-governmental facilitator, coordinator, and advocate of excellence in Antarctic and Southern Ocean science and research. Secondly, SCAR's mission is to provide independent, sound, scientifically-based advice to the Antarctic Treaty System and other policy makers including the use of science to identify emerging trends and bringing these issues to the attention of policy makers."



Highlights in this issue

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SCAR focus on . . . the Southern Ocean Observing System

The Southern Ocean provides the principal connection between the Earth's ocean basins and between the upper and lower layers of the global ocean circulation. As a result, the Southern Ocean strongly influences climate patterns and the cycling of carbon and nutrients. Changes in the Southern Ocean would therefore have global ramifications.

Limited observations suggest the Southern Ocean is indeed changing: the region is warming more rapidly than the global ocean average; salinity changes driven by changes in precipitation and ice melt have been observed in both the upper and abyssal ocean; the uptake of carbon by the Southern Ocean has slowed the rate of atmospheric climate change but caused basin-wide ocean acidification; and Southern Ocean ecosystems are reacting to changes in the physical and chemical environment. However, the short and incomplete nature of existing time series makes the causes and consequences of observed changes difficult to assess. Sustained, multi-disciplinary observations are required to detect, interpret and respond to change.

A Southern Ocean Observing System (SOOS) is needed to address six overarching challenges in Southern Ocean science:

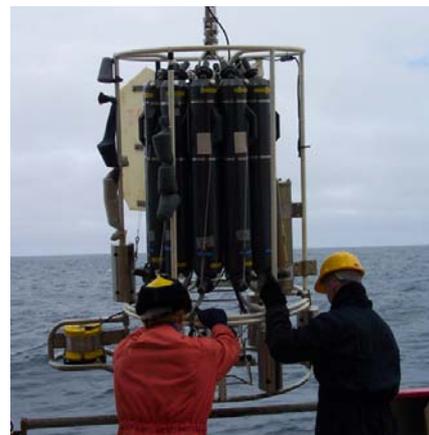
1. The role of the Southern Ocean in the planet's heat and freshwater balance;
2. The stability of the Southern Ocean overturning circulation;
3. The role of the ocean in the stability of the Antarctic ice sheet and its contribution to sea-level rise;
4. The future and consequences of Southern Ocean carbon uptake;
5. The future of Antarctic sea ice;
6. The impacts of global change on Southern Ocean ecosystems.

There is an urgent need to increase understanding in each of these areas to inform decision-makers confronted with the challenges of climate change, sea level rise, ocean acidification, and the sustainable management of marine resources. To deliver this information, sustained observations of the physical, biogeochemical and biological state of the Southern Ocean are critical.

The lack of historical observations has slowed progress in understanding the Southern Ocean and its connections to other parts of the Earth system. However, advances in technology and knowledge mean that it is now possible to design and implement a sustained, feasible and cost-effective observing system for this remote environment.

Users of the SOOS will include the re-

Conductivity / Temperature / Depth measurements in the Drake Passage. Photo Mike Sparrow



search community, managers of marine resources, policy makers, local planners, ship operators, Antarctic tourism operators, weather and climate forecasters, and educators.

A SOOS Design Plan has been completed and is currently being formatted for printing and distribution (as well as being made available online). This plan outlines the scientific rationale and strategy for the SOOS; identifies the variables to be observed; presents a draft plan for an integrated multi-disciplinary observing system for the Southern Ocean; and identifies the next steps required for implementation.

An International Program Office is being established at the Institute of Marine and Antarctic Studies in Hobart, Australia, and an Executive Officer, Louise Newman, has been appointed. The SCAR/SCOR Oceanography Expert Group, chaired by Mike Meredith and John Gunn, will act as a Scientific Steering Committee, with a new membership that is currently under discussion. We look forward to individual scientists, institutions and those with an interest participating in and supporting the aims of the SOOS.

Article by Mike Sparrow, Executive Director.

Photo from Boehme, L., P. L. Lovell, M. Biuw, F. Roquet, J. Nicholson, S. E. Thorpe, M. Meredith and M. A. Fedak, 2009, Animal-borne CTD-Satellite Relay Data Loggers for real-time oceanographic data collection., Ocean Science, 5, 685-695, doi:10.5194/os-5-685-2009



Female Southern elephant seal tagged with a CTD-SRDL after her annual moult on South Georgia

IPCC Fifth Assessment Report - the Coordinated Regional Downscaling Experiment

Researchers / research groups planning to perform regional simulations in the Arctic or Antarctic as part of CORDEX (the Coordinated Regional Downscaling Experiment) and in support of the IPCC Fifth Assessment Report are encouraged to provide contact details and plans for their simulations to John Cassano (john.cassano@colorado.edu).

A mailing listing of all groups performing polar CORDEX simulations will be formed and will provide a method for the polar modeling community to interact regarding polar simulations. This mailing list will also be used to alert the community to upcoming workshops / meetings of interest and other opportunities for collaboration. A workshop to discuss initial Arctic CORDEX results is currently being planned and will be held in March 2012 in Sweden. Additional details regarding this workshop will be announced at a later date.

Additional information about CORDEX can be found at: http://wcrp.ipsl.jussieu.fr/SF_RCD_CORDEX.html
Information about the CORDEX multi-model archive can be found at: <http://cordex.dmi.dk/joomla/>

The SCAR Data Policy

Scientific data are of priceless value. Antarctic data are often unique and always very expensive to collect. Data are at the base of all modern science.

SCAR takes its responsibility for and role in the preservation of data very seriously. The basic philosophy here is that all relevant scientific data should be preserved and should be shared fully, freely and openly to the benefit of current and future generations of scientists as well as society at large.

The adoption of the SCAR Data Policy by the SCAR Delegates at their Meeting in Buenos Aires in August, 2010, marks the beginning of a new era in SCAR data management. Being one of the key elements of the SCAR Data and Information Strategy (http://www.scar.org/publications/reports/Report_34.pdf, adopted by the SCAR Delegates and EXCOM in July 2009), the SCAR Data Policy has now officially been published (<http://www.scar.org/publications/reports/Report39.pdf>, June 2011).

The release of this Newsletter offers an ideal opportunity to highlight some crucial aspects of the SCAR Data Policy to the SCAR community. It is important to take notice of the data policy, since it concerns all scientists and national projects and programmes, active within SCAR.

As a preamble, the SCAR Data Policy states that: “SCAR-related research data is highly multidisciplinary and disparate. This policy aims to provide a framework for these data to be handled in a consistent manner, and to strike a balance between the rights of investigators and the need for widespread access through the free and unrestricted sharing and exchange of both data and metadata.”

SCAR data are “those data generated under the auspices of a SCAR-sponsored Research Project”. Strictly speaking, the SCAR Data Policy is only applicable to those data, but it should be recognized that SCAR researchers will also use data from non-SCAR sources. Wherever possible, both ‘SCAR generated’ and ‘SCAR

used’ data should be treated according to the SCAR Data Policy norms.

The actual SCAR Data Policy statement is “...in order to maximize the benefit of data gathered under the auspices of SCAR Projects, the SCAR Executive Committee (EXCOM) requires that SCAR data, including operational data delivered in real time, are made available fully, freely, openly, and on the shortest feasible time-scale”.

“Full and open access” are defined as ‘equitable, non-discriminatory access’.

“Free and unrestricted” are defined as nondiscriminatory and without charge.

“Without charge” means at no more than the cost of reproduction and delivery, without charge for the data and products themselves.

The SCAR Data Policy is in full accordance with the data principles of SCAR’s parent body, ICSU and other relevant international agencies (e.g. WMO), and with the goals of Article III-1c of the Antarctic Treaty.

The only exceptions to this policy of full, free, and open access are:

- where human subjects are involved,

confidentiality must be protected;

- where data release may cause harm, specific aspects of the data may need to be kept protected (for example, locations of nests of endangered birds).

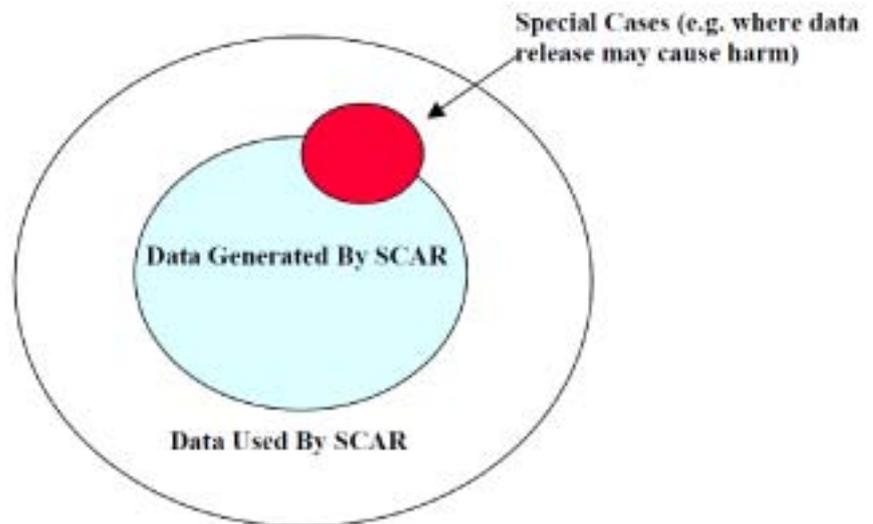
The SCAR Data Policy calls on nations to identify and/or establish National Discipline-based or National Antarctic Data Centres to facilitate long-term preservation and sustained access to SCAR data.

It is essential that data contributors get due credit for collecting, processing and providing access to the data. The SCAR Data Policy thus requires users of SCAR data to formally acknowledge the data contributors, preferably in the form of a citation, such as when citing a book or journal article.

The SCAR Data Policy is the first step in the implementation process of the SCAR Data and Information Management Strategy (DIMS).

Article by Taco de Bruin (Taco.de.Bruin@nioz.nl) and Kim Finney (Kim.Finney@aad.gov.au) from the SCAR Standing Committee on Antarctic Data Management (SCADM)

Figure 1. Graphical definition of “SCAR data” (inner blue circle), “SCAR-related data” (outer circle), and Special Cases (red circle).



News from SCAR

WMO-ROSHYDROMET Workshop on the International Polar Decade Initiative

A WMO-Roshydromet Workshop on the International Polar Decade (IPD) Initiative was hosted by Roshydromet at the Arctic and Antarctic Research Institute (AARI) of Roshydromet in St. Petersburg on 14 and

15 April 2011. The Workshop attendees met in St. Petersburg to exchange views on the IPD initiative and its potential development. The results of the Workshop will be presented to the Sixteenth World Me-

teorological Congress, to be held in Geneva from 16 May to 3 June 2011 and will be discussed at the next SCAR Executive Committee Meeting.

News from SCAR . . . and further afield

Partnership with IASC reconfirmed and renewed

With a renewed Letter of Agreement, the International Arctic Science Committee (IASC) and SCAR have again confirmed and underlined the importance of the synergy between both organisations in polar and bipolar research.

The first Letter of Agreement, signed in July 2006, was designed to enable the two organisations to make a more effective contribution to the success of the International Polar Year than they might otherwise have made. SCAR and IASC agreed to combine their efforts to raise the level of impact of both organisations in terms of making scientific advances and of advising policy makers (for example of the likelihood and likely effects of climate change), as well as to avoid duplication.

With the present letter, SCAR and IASC agree to continue this partnership, taking into account the development of both organisations during the last five years and the lessons learnt from the IPY 2007/2008.

The IASC / SCAR Bipolar Action Group



There are many common interests between SCAR and IASC in scientific research in the polar regions and much to be gained from developing a synergy between SCAR and IASC in polar and bipolar research.

To assist IASC and SCAR in thinking about how they might work yet more closely together in future, and how they might best contribute to the International Polar Year and its legacy, a Joint Bipolar Action Group (BipAG) was formed in early 2008. This joint Action Group provided very useful advice to the SCAR and IASC Executive Committees and helped to ini-

tiate a number of joint bipolar activities.

SCAR and IASC agreed to perpetuate this joint advisory group for another two years and to establish BipAG II, the joint Bipolar Action Group on Science Cooperation, with the term of reference to advise the SCAR and IASC Executive Committees on the development of instruments such as workshops, programmes and networks to address bipolar issues. IPY Legacy issues are now considered at the level of joint meetings of the SCAR and IASC Executive Committees. The recommendations from the first meeting of BipAG II include not only science ideas but also opportunities for developing the next generation of polar scientists, suggestions for more effective science coordination and data management and ideas for better communicating the importance of the Polar Regions for Planet Earth.

The full report of the latest and previous meetings are available from: <http://www.scar.org/about/partnerships/iasc/bipag2.html>

SCAR Cross-linkages Meeting

The SCAR 4th cross linkages meeting was held on the 5-6 May 2011 in Ottawa, Canada. The aims of the meeting were:

- (i) to discuss current activities from a cross cutting perspective,
- (ii) to concentrate on new ideas that cross cut programmes and disciplines, and

(iii) to identify emerging issues and new frontiers on the horizon that are interdisciplinary.

Many items were discussed, including improving linkages and synergies between the proposals for the next generation of Scientific Research Programmes, the next

generation of Antarctic Climate Change and the Environment publications and interactions with other partner organisations.

The full meeting report is available from: <http://www.scar.org/publications/bulletins/Bulletin178.pdf>.

China plans new icebreaker

China will start building a new icebreaker later on this year and the vessel is expected to be in operational in polar expeditions in 2013.

Together with M/V Xuelong (or Snow Dragon), a 21,250-tonne icebreaker and research vessel purchased from Ukraine

in 1993, the new ship will help maximise annual expedition time in the Arctic and the Antarctic. With a displacement of 8,000 tonnes, the new vessel, which will cost about \$300 million, is smaller than Xuelong. But it will be able to break through thicker ice (up to 1.5 meters) and will house state-of-the-art research facilities.

ties.

In addition to the new icebreaker, fixed-wing aircraft will be available to expedition teams in the Antarctic by 2015, allowing aerial studies of the Antarctica's Grove Mountains and transport of researchers between stations.

NERC Planet Earth Podcast on flood defences and the Southern Ocean

Why removing some man-made coastal flood defences might not be such a harebrained idea, what it's like studying gas exchange in the wilds of the Southern Ocean, and – in what could be the first case of 'natural' geoengineering – how forests could be whitening the clouds right above them.

David Tupman from the University of

Leeds is on a research ship in the wilds of the Southern Ocean to attempt to measure how fast rough seas take up carbon dioxide compared with calm seas. It's not all plain sailing though – as we find out.

Read the background and listen to the podcast on the NERC Planet Earth website at <http://planetearth.nerc.ac.uk/multi-media/story.aspx?id=979>



*The Southern Ocean
Image from the NERC Planet Earth website*

Antarctic Science

Subtropical rainfall and the Antarctic ozone hole

For more than 100 years, researchers have understood that stratosphere ozone, the atmospheric layer between 10 and 50 km above Earth's surface, plays an important role in absorbing ultraviolet radiation and protecting life on Earth. In 1985, scientists and the public became alarmed when it was reported that, during the Antarctic spring, stratospheric ozone concentrations over the continent were declining by as much as 50%, indicating the presence of a polar "ozone hole."

Implementation of the 1987 Montreal protocol, an international agreement that phased out the use of some chloro-

fluorocarbons and other compounds that destroy stratospheric ozone, has led to the first stage of recovery. Researchers, however, had not widely recognized the ozone hole's impact on the climate of the troposphere (the lowest 10 km of the atmosphere) until recent observational and state-of-the-art climate modelling studies. These studies showed that ozone depletion has a large influence during the Antarctic summer, when it drives a major air current called the mid-latitude westerly jet to a higher latitude, closer to Antarctica. This reduces sea level pressure over the continent, cooling much of the continental interior, coinciding with a warming of the Antarctic Peninsula.

Kang et al. expand our understanding of ozone depletion's impact on climate. Using a series of carefully designed climate model experiments, they show that ozone-induced climate change is not confined just to the vicinity of Antarctica but extends over much of the Southern Hemisphere, even reaching the tropics, where it appears to have resulted in increased summer precipitation in the subtropics.

Read the full article in *Science* at www.sciencemag.org/content/332/6032/925.full

Marine ecosystems of Antarctica under threat from human activity

A team of scientists in the United Kingdom and the United States has warned that the native fauna and unique ecology of the Southern Ocean, the vast body of water that surrounds the Antarctic continent, is under threat from human activity. Their study is published in the peer-reviewed journal *Annals of the New York Academy of Sciences*.

"Although Antarctica is still the most pristine environment on Earth, its marine ecosystems are being degraded through the introduction of alien species, pollution, overfishing, and a mix of other human activities," said team member Dr Sven Thatje of the University of Southampton's School of Ocean and Earth Science (SOES),

based at the UK's National Oceanography Centre.

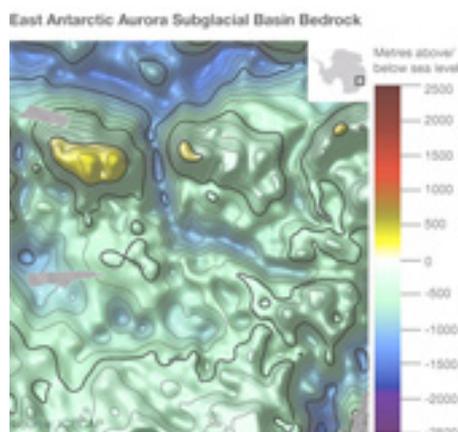
Biodiversity can be conceptualised in terms of its information content: the greater the diversity of species and interactions between them, the more 'information' the ecosystem has. "By damaging the ecological fabric of Antarctica, we are effectively dumbing it down - decreasing its information content - and endangering its uniqueness and resilience," said lead author Professor Richard Aronson, a paleoecologist at the Florida Institute of Technology, USA.

Read a full report on the *ScienceDaily* website: <http://www.sciencedaily.com/releases/2011/03/110331104003.htm>



Seastars and giant ribbon worms at McMurdo Sound, Antarctica, 32 metre depth. (Credit: Photo by R. B. Aronson)

Antarctic survey reveals rugged buried landscape



Close in map of the rock under the ice sheet, showing one of the subglacial fjords. All of the green and blue areas currently lie below sea level.

Survey data taken across a great swathe of the east of the white continent has allowed scientists to map the shape of the bedrock buried deep under the ice. It reveals in new detail a huge trough hundreds of kilometres long that is cut by fjord-like features.

Researchers tell *Nature* magazine that this hidden landscape was probably moulded by the action of glaciers more than 14 million years ago. This was a time when Antarctica was only part way through acquiring the extensive ice covering we know today. The team behind the survey work believes its data will improve not only our understanding of Antarctica's past but also its future, as the continent contends with a potentially much warmer world.

"This type of study is important to understand how ice flows in Antarctica and how it will flow in the future," said Professor Martin Siegert, from the University of Edinburgh, UK. "The only way you can do that is with models, and models need topography on which to grow and flow the ice. If our topography doesn't resemble the reality then the outputs from the models won't either," he told BBC News.

Read the full *BBC News* item at <http://www.bbc.co.uk/news/science-environment-13616725>

or read the full original article in *Nature*: <http://www.nature.com/nature/journal/v474/n7349/full/nature10114.html>

Antarctic Science

Why penguins are afraid of the dark



An Adélie penguin checks for predators before taking the plunge. Credit: Viola Toniolo

Antarctic birds should hunt at night, but they don't.

Like daily commuters, Adélie and emperor penguins are up at dawn, catching krill and fish in Antarctic waters, and back home to shore at dusk. Yet the food they prefer to dine on is easiest to catch after dark. Most researchers assumed that penguins had poor night-time vision, which was why they stayed out of the water after dusk.

But in a new study, two marine ecologists argue that the penguins actually have no trouble seeing in the dark. Instead, they say, penguins head for shore at night because they cannot gauge the risk of being eaten by leopard seals or killer whales.

For further details, read the full *Science* news item: <http://news.sciencemag.org/sciencenow/2011/06/why-penguins-are-afraid-of-the-d.html?etoc>

Poison, dogs deployed to rid rampant rabbits from island

Remote, windswept Macquarie Island in the Southern Ocean is being purged of its rabbits in a massive eradication programme designed to reverse more than a hundred years of environmental destruction.

Lying between Australia and Antarctica, the island has been over-run by the rabbits which were introduced by sealers in the 1870s as a source of food.

Rob Muir reports in a *Reuters* video news

item:

<http://www.reuters.com/video/2011/05/31/poison-dogs-deployed-to-rid-rampant-rab-b?videoid=211254186&videoChannel=4>

'Success' in South Georgia rat eradication

The brown rat has been a catastrophic introduction to South Georgia. Conservationists say they are pleased with early efforts to kill rats on the island, in what is the biggest rodent eradication campaign in history.

No-one really knows how many rats inhabit the island in the South Atlantic, but it

could be millions. Introduced on the ships of sealers and whalers in the 19th and 20th Centuries, the rodents have had a devastating impact on local seabird populations.

But the laying of toxic bait in part of the island seems to have had success. Some 50 tonnes of rodenticide were spread by

helicopters in March over a contained zone hemmed in by glaciers. Subsequent inspections on the ground found only dead rats.

Read the full story on the *BBC News* website at <http://www.bbc.co.uk/news/science-environment-13282806>

Impact of Antarctic Circumpolar Current Development on Late Paleogene Ocean Structure

Global cooling and the development of continental-scale Antarctic glaciation occurred in the late middle Eocene to early Oligocene (~38 to 28 million years ago), accompanied by deep-ocean re-organisation attributed to gradual Antarctic Circumpolar Current (ACC) development.

Katz et al in *Science* (27 May 2011) use benthic foraminiferal stable isotope comparisons to show that a large $\delta^{13}C$ off-

set developed between mid-depth (~600 metres) and deep (>1000 metres) western North Atlantic waters in the early Oligocene, indicating the development of intermediate-depth $\delta^{13}C$ and O_2 minima closely linked in the modern ocean to northward incursion of Antarctic Intermediate Water. At the same time, the ocean's coldest waters became restricted to south of the ACC, probably forming a bottom-ocean layer, as in the modern ocean. They show that the modern four-layer

ocean structure (surface, intermediate, deep, and bottom waters) developed during the early Oligocene as a consequence of the ACC.

For further details, please read the full article in *Science*: http://www.sciencemag.org/content/332/6033/1076.abstract?sa_campaign=Email/toc/27-May-2011/10.1126/science.1202122

\$300,000 Fellowship to sequence Antarctic Krill genome

The genome of one of the most successful species on Earth, Antarctic Krill, will be sequenced for the first time thanks to a new Australian Government \$300,000 Antarctic Science Fellowship.

The inaugural R J L Hawke Post Doctoral Fellowship in Antarctic Environmental Science has been awarded to geneticist, Dr Bruce Deagle. The award honours former Prime Minister Bob Hawke's contribution to protecting the frozen continent.

Dr Deagle will use modern genetic technologies to sequence the crustacean's genome, as well as examine gene expression and how this relates to temperature and ocean acidification.

Read the full story on the Australian Antarctic Division website: [http://www.antarctica.gov.au/media/news/2011/\\$300,000-fellowship-to-sequence-antarctic-krill-genome](http://www.antarctica.gov.au/media/news/2011/$300,000-fellowship-to-sequence-antarctic-krill-genome)



Former Australian Prime Minister, Bob Hawke, congratulates the inaugural winner of the Fellowship, Dr Bruce Deagle. (Photo: Kristin Yates)

Polar News

Paul Nicklen: Tales of ice-bound wonderlands

Diving under the Antarctic ice to get way too close to the much-feared leopard seal, photographer Paul Nicklen found an extraordinary new friend.

Share his hilarious, passionate stories of the polar wonderlands, illustrated by glorious images of the animals who live on and under the ice.

Paul Nicklen photographs the creatures of

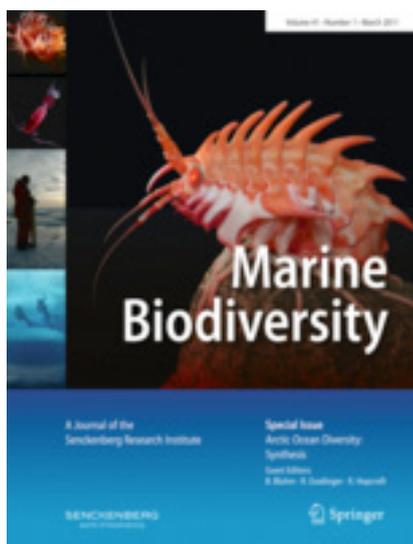
the Arctic and Antarctic, generating global awareness about wildlife in these isolated and endangered environments.

You can view Paul Nicklen's illustrated lecture at http://www.ted.com/talks/paul_nicklen_tales_of_ice_bound_wonderlands.html

See more of his polar images at <http://www.paulnicklen.com/>



Leopard Seal (National Geographic, photograph by John Eastcott and Yva Momatiuk)



Special Issue of Marine Biodiversity available

A special issue in the Springer journal *Marine Biodiversity* (Vol 41-1) was published in March 2011 under the umbrella of the Census of Marine Life's Arctic Ocean Diversity project. International author teams from 10 countries and more than 25 institutions contributed 10 articles covering 210 pages and spanning microbes to marine mammals on a pan-scale.

Most articles contain new synthetic numerical analyses, as well as reviews of current knowledge, contemporary perspectives, and several presently expected future scenarios. Many include pan-arctic species inventories by realm and regions,

and provide an urgently needed assessment of current diversity patterns that can be used for evaluating the effects of climate change and anthropogenic activities in the Arctic. The Arctic Register of Marine Species containing most of these inventories is now available. The majority of taxon distribution records underlying the register (and the papers in this issue) are available through the Ocean Biogeographic Information System (OBIS) and the Arctic Ocean Diversity project's webportal.

View the Special Issue of *Marine Biodiversity* at <http://www.springerlink.com/content/m551857m443/>

APECS Update and Upcoming Events

The APECS Research Activities Committee has initiated a new series of 'Disciplines of the Month' which highlight the work and resources of APECS members and mentors in a particular research area. July is Glaciology (<http://www.apecs.is/research-fields/terrestrial/glaciology/>)! In addition to sharing publications, research updates, outreach efforts, mentors, and webinars, we will be hosting a Virtual Poster Session on July 28th, including at least one speaker from the SCAR community. Join our mailing list to keep in touch with APECS Glaciology and join in with our Discipline of the Month! Upcoming months are scheduled to highlight Sea Ice, Permafrost, and Microbial Ecology.



SCAR / APECS workshop during the 2010 SCAR OSC
(c) Francisco Fernandez

and webinars, we will be hosting a Virtual Poster Session on July 28th, including at least one speaker from the SCAR community. Join our mailing list to keep in touch with APECS Glaciology and join in with our Discipline of the Month! Upcoming months are scheduled to highlight Sea Ice, Permafrost, and Microbial Ecology.

Upcoming APECS events (www.apecs.is/events) will include a mentor panel at the British Branch meeting of the International Glaciological Society (British Antarctic Survey, September), we have partnered with CAREX for their upcoming meeting on life in extreme environments (Dublin, October; <http://apecs.is/events/carex-2011>), and there will be an APECS presence in both science and outreach at the AGU Fall Meeting (San Francisco, December).

Contributed by Allen Pope, APECS President,
email: ap556@cam.ac.uk

Books

A Review of the International Polar Year 2007-2008

by Colin Summerhayes, Scott Polar Research Institute

To most people the poles seem far away. They are cold, remote, harsh places, difficult to access. Few have the stomach (or perhaps the money) to even contemplate touring there. Yet these global refrigerators hold key clues to the operation of the climates and sea levels that affect us all, no matter where we live. Indeed, the poles are so susceptible to tiny changes in heating that they amplify tiny climate signals, the effects of which then spread outwards like ripples round a stone dropped into a dark pool.

The human urge to explore, to find out what lies over the next ridge, opened up the poles first to geographic discovery, then to exploitation – of seals and whales – and finally to science. Given the tremendous difficulties of making progress in such harsh environments it has proved imperative to tackle scientific questions through large operations mounted usually by national organizations – like the British Antarctic Survey. But even individual national efforts by such masters of their field are too puny to answer some of the burning questions concerning the behaviour of such enormous regions as the whole of the Arctic Ocean, or the entire Antarctic continent, or the behaviour of the Earth's magnetic field – which only be well observed in such far off regions. In recognition of that constraint, polar scientific collaboration has ensued ever since the first International Polar Year of 1882-83, a concept invented by Karl Weyprecht following his single nation expedition to Franz Joseph Land in 1872, and his realization that single nation approaches were inherently defective in the face of the polar challenge. Every 50 years or so, following new developments in thought or technology, scientists have felt a need to follow Weyprecht's footsteps – hence the IPYs of 1932-33, 1957-58 (re-baptized the International Geophysical Year), and now 2007-2008.

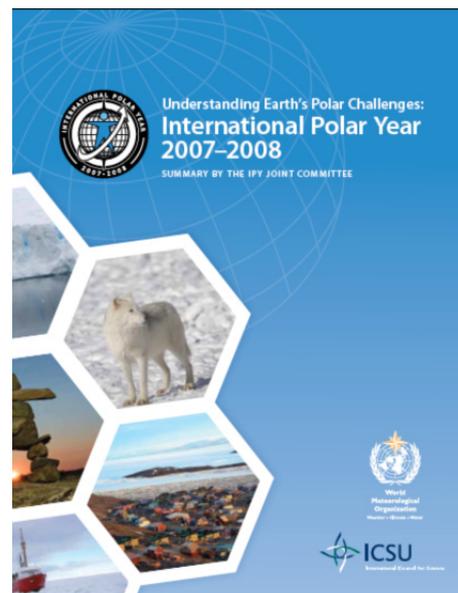
This latest of 'Weyprecht's children' brought together some 50,000 students, scientists, crews, technicians and indigenous peoples from more than 60 nations working on 228 international IPY projects (170 in science, 1 in data management, and 57 in education and outreach) with a total budget of US\$1.3 billion, some US\$800 million of which was new money. These totals ignore the business as usual of the national polar programmes and institutes, and what was spent by the space community in carrying out its routine observations of the land, ice, sea and at-

mosphere and providing essential aids to positioning and communication for those on the Earth's polar surface. This was by far the largest research effort ever undertaken in the polar regions, and many of the projects begun during the IPY still continue.

A wealth of initial scientific findings have now been summarised in "Understanding Earth's Polar Challenges: International Polar Year 2007-2008" a report from the Joint Committee that steered the IPY under the aegis of its two sponsors, the International Council for Science (ICSU) and the World Meteorological Organization (WMO). The summary report of 720 pages compiled by 300 authors or reviewers and edited by a team of 9 (of whom I was one) was made available in a limited number of hard copies at the end of March 2011, but is now downloadable either entire or in individual sections (planning; research; observations; outreach; and legacies) from the ICSU web site at www.icsu.org/publications/reports-and-reviews/ipy-summary.

Global warming provided a backdrop, with the Antarctic Peninsula and some Arctic regions warming twice as fast as the global average. Readers will recall, for example that in September 2007 the extent of sea ice in the Arctic Ocean fell to a record minimum – and the trend since has remained on a downward path. IPY research shows that climate change also affects physical, chemical and biological processes near the poles in many more subtle ways. Changes in the Arctic Ocean are affecting ocean circulation in the North Atlantic, which may cool mid latitudes while the Arctic warms. Recent winters have seen Siberia, the USA and northwest Europe cool, while Greenland and the Canadian north warm. The culprit seems to be the Arctic Oscillation in air pressure.

IPY was not just about climate. More than 1,000 previously unknown species of marine animal were found in the Southern Ocean. Of these, 250 are found at both poles. IPY also advanced polar knowledge of geology and tectonics, astronomy, animal and human health, and environmental changes affecting indigenous people in the Arctic. It showed how indigenous knowledge can be combined with instrumental data for monitoring change, for instance in polar ice, snow, vegetation, and fauna. The South Pole Telescope detected a previously unknown class of galaxy clusters. Investigators mapped a previously unexplored mountain range beneath



the Antarctic ice – the Gamburtsev Mountain chain, around which the Antarctic ice sheet may have been initiated millions of years ago. These are just a taste of the many discoveries made.

IPY was not just about science, it also fostered communication. Two major IPY conferences have now been held – the first, organized by SCAR and IASC, took place in St Petersburg, Russia in July 2008, and the second, in Oslo, Norway, in June 2010. A third and final major IPY conference is scheduled for April 2012, in Montreal, Canada. One by-product of the IPY's bringing young scientists together was the creation of the Association of Polar Early Career Scientists (APECS), now co-sponsored by SCAR and IASC. Films for the public and workshops for teachers have been integral parts of the IPY conferences. IPY 2007-2008 also fostered outreach to schools throughout its existence, notably under the energetic leadership of David Carlson, Director of the IPY International Programme Office housed at BAS, and his team.

Great strides were made in comparison with previous IPYs, not least by expanding this one to include the full range of scientific activities by adding biology, ecology, human health, and the social sciences and humanities in addition to traditional polar research fields. It sent a powerful message to the wider community about change in the polar regions and what that means globally.

Turning to the future, this weighty tome provides guidance for the maintenance of key IPY legacies. Four of them are par-

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Books

Book Summary

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ticularly important. First is the development of sustained observing systems. The polar regions are grossly under-sampled in comparison with the rest of the Earth, which means that our understanding of the workings of the global climate system are less adequate than they should be at a time of increasing demand for accurate projections of future change – here, for example, designs for ocean observing systems have been developed during IPY under the leadership of SCAR for the south and IASC for the north, and the Climate and Cryosphere (CliC) programme led design of a cryosphere observing system. Second is the development of adequate numerical modeling in the polar regions. Today's climate models are not designed with polar climates in view, which means they are not able to reproduce climate effects as accurately as required. And we do not yet have the ability to model accurately the behaviour of ice sheets to changing climates, which means we cannot accurately forecast changes in sea level. Third is the development and application of a system for collating, managing and making it easy to exchange data. The IPY data and information subcommittee suggested how IPY data and information should be managed for the future, and SCAR led the way in developing a data and information management strategy. One is still needed for the Arctic, but ICSU is promoting this indirectly by working with SCAR, IASC and others to develop a "Polar Information Commons" from which all can benefit. Individual nations and Principal Investigators still need further encouragement to follow the motto "collect once, use many times", by making their data public for others to benefit from. Finally, fourth is ensuring the development of the polar researchers of tomorrow, which has led to the formation of APECS – described above. SCAR and IASC will be key players together in taking these legacies forward.

In summary, then IPY 2007–2008 helped to strengthen the theoretical and practical underpinning of polar research; advanced our understanding of polar processes and of their global linkages; established new baseline data sets in many fields against which future change can be assessed; launched new and enhanced observing systems that will produce long-term benefits to many stakeholders; and trained a new generation of scientists to carry its legacy into the future. Its success is evident from this landmark volume, which will form a blueprint for the next IPY.

Science Diplomacy: Antarctica, Science, and the Governance of International Spaces

Edited by Paul Arthur Berkman, Michael A. Lang, David W.H. Walton, and Oran R. Young



Meeting in Washington, D.C., on 1 December 1959, 12 nations came together to adopt the Antarctic Treaty. Fourteen articles would provide the basis for the governance of nearly 10% of the Earth "for peaceful purposes only."

This volume brings together key elements of the Antarctic Treaty Summit, which was convened in 2009 to celebrate 50 years of this important Treaty. Through it we can understand the future governance of international spaces beyond sovereign jurisdictions.

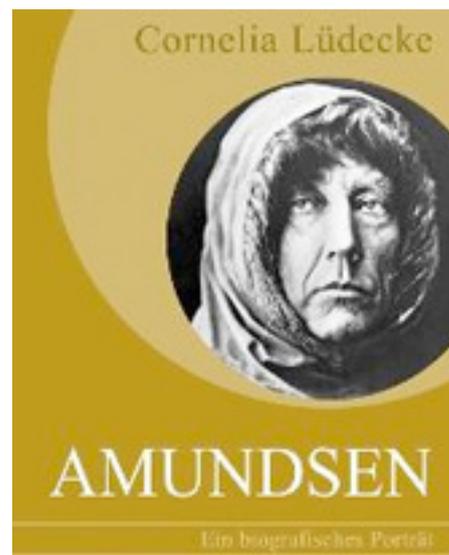
Published by the Smithsonian Institution Scholarly Press in May 2011, the full volume is available to download from <http://www.scholarlypress.si.edu/index.cfm>. Individual papers will be available later.

New Biography of Amundsen published in German

A new biography of Roald Amundsen, assessing his expeditions, life and legacy, has just been published in German. It was written by the chair of the SCAR History Group, Cornelia Lüdecke.

Amundsen is famous for achieving the geographic South Pole ahead of Captain Scott, but this was just one of his numerous expeditions. For more information about the book, please contact the author (C.Luedecke@lrz.uni-muenchen.de).

Roald Amundsen: Ein biografisches Porträt. Cornelia Lüdecke. Verlag Herder, Freiburg 2011. 12 Figures, Format: 12,0 x 19,0 cm, 204 pp., Flexcover ISBN 978-3-451-06224-7



Coming soon . . .

Science in the Snow:

Fifty years of international collaboration through the Scientific Committee on Antarctic Research

David W H Walton & Peter D Clarkson

(With additional material by Colin Summerhayes)

Details will be posted on the SCAR website shortly
For more information, please email info@scar.org

Forthcoming Events

25th International Congress for Conservation Biology (ICCB 2011) University of Auckland, New Zealand, 5 December 2011

A full-day interdisciplinary workshop entitled 'Exploring linkages between environmental management and value systems – the case of Antarctica', is intended for scholars of any discipline interested in value systems, environmental management, societal and political responsibilities for and engagement with wilderness areas, Antarctica.

This workshop focuses on the connection between the values attributed to a certain environment and its management. Using the case of Antarctica, a continent without an indigenous human population, we

will discuss how the human impressions of and engagement with Antarctica inform environmental management decisions. These impressions and opinions might influence decisions that, collectively, can affect entire global systems, primarily through their impacts on climate, natural resources, and international policy.

We invite a broad spectrum of contributions on topics ranging from value frameworks and the conceptualisation of values to value-based management and conservation with a special focus on the Antarctic. Contributions from scholars of



Photo courtesy of Peter Clarkson

all disciplines are welcome as we want to encourage an interdisciplinary discussion. More details are on the SCAR Events page (see below). If you are interested in taking part, please email Daniela Liggett (daniela.liggett@canterbury.ac.nz).

Call for Abstracts IPY 2012 Conference

Abstracts Now Open

The IPY 2012 Conference From Knowledge to Action is taking place in Montreal, Canada April 22-27, 2012 and will be one of the largest and most important scientific conferences for polar science and climate change, impacts and adaptation. The Call for Abstracts for oral and poster presentations is now open. Conference organizers invite you to submit abstracts on the latest polar science, as well as the application of polar research findings, policy implications and how to take polar knowledge to action. The Conference programme is available at www.ipy2012montreal.ca.

World Conference on Marine Biodiversity 26 - 30 September 2011, Aberdeen, Scotland, UK

There will be an EBA themed session (number 23) during the World Conference on Marine Biodiversity. This meeting will provide an excellent opportunity to discuss and compile the EBA community's advances in Marine Antarctic Environments.

There will also be a pre-meeting workshop on Sunday 25 September 2011 from 09.00-17.00. Most themes within the workshop are related to EBA workpackage 4, and it will also be an oppor-

tunity to discuss the two new SCAR programme proposals: Antarctic Ecosystems: Adaptations, Thresholds and Resilience (AntETR) and State of the Antarctic Ecosystem (AntEco), and to provide a constructive contribution to their planning groups.

For more information, please visit the Conference website (<http://www.marine-biodiversity.org/>), or contact Lucia Campos, Universidade Federal do Rio de Janeiro (email: luciascampos@gmail.com).



SCAR 2012 Biennial Meetings and

Open Science Conference Portland, Oregon, July 13 to 25, 2012



The Local Organizing Committee and Portland State University look forward to welcoming the Antarctic community to Portland, Oregon in July of 2012.

July is prime time in Oregon, from the eastern desert to the western shores, our skies are blue and the living is easy. We hope you will be able to arrive early or stay late and get to know us. Both Portland State University and the conference hotel, the Hilton Portland, are located in the heart of the city, with convenient public transportation connections to Portland International Airport and city attractions.

Travel to and around Portland is easy. Portland International Airport (PDX) has direct connections to major airport hubs throughout the United States, as well to Europe, and Asia. Portland's public transportation system is, extensive, easy to use, and rail is free downtown. When you arrive at PDX, buy your ticket at the airport station, board the Max (light rail) Red Line, and about 45 minutes later, beark at Pioneer Courthouse Square, only a few blocks away from the meeting venue.

For details of further events, please visit: <http://www.scar.org/events/>



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Format and design by Rosemary Nash